United Nations E/CN.18/AC.2/2003/3

Economic and Social Council

Distr.: General
27 October 2003

Original: English

**United Nations Forum on Forests**
**Ad hoc Expert Group on Finance and Transfer of Environmentally Sound Technologies**
Geneva, 15-19 December 2003
Item 4 of the provisional agenda*
**Tasks of the Expert Group**

# Transfer of environmentally sound technologies for sustainable forest management: an overview

## Note by the Secretariat

*Summary*

The note by the secretariat of the United Nations Forum on Forests provides background information to assist the ad hoc expert group on finance and transfer of environmentally sound technologies for sustainable forest management in carrying out its tasks. The note highlights 38 of the 270 Intergovernmental Panel on Forests/Intergovernmental Forum on Forests proposals for action, divided into 10 thematic areas, which deal with environmentally sound technologies for sustainable forest management, with all but 5 addressing the issue of transfer of environmentally sound technologies. It defines the scope of environmentally sound technologies and provides information on existing initiatives for the transfer of technologies for sustainable forest management. It also identifies barriers to, as well as approaches for improving the transfer of technologies for sustainable forest management.

Environmentally sound technologies for sustainable forest management encompass a broad range of technologies, knowledge and policy instruments. These include scientific know-how, traditional forest-related knowledge, assessment and monitoring technologies, integrated information management systems, sustainable forest management practices, silviculture, harvesting and processing technologies, recycling of wood, fuel wood energy technologies, sound technologies for secondary wood products, economic instruments and mechanisms for sustainable forest management, certification and labelling approaches and forest-related climate change mitigation mechanisms.

* E/CN.18/AC.2/2003/1.

03-58274 (E) 041203

The issue of technology transfer needs to be viewed within the broader framework of the role of sustainable forest management in contributing to the global development agenda, particularly on issues such as poverty eradication, improved food security, access to safe drinking water, affordable energy, changing unsustainable patterns of consumption and production and protecting and managing the natural resource base for economic and social development. A number of international organizations are actively supporting the transfer of environmentally sound technologies for sustainable forest management.

There are a number of constraints affecting the transfer of environmentally sound technologies, which include limited financial resources, institutional and policy constraints, human resources problems, limited access to information on environmentally sound technologies and knowledge for sustainable forest management. More forest research and development as well as outreach programmes, involving the private sector and local communities, are needed. Inappropriate regulations favouring short-term profits over long-term sustainability and unfavourable land tenure regimes can also become constraints affecting the transfer of environmentally sound technologies.

In general, the principle of sustainable forest management should be considered an essential element in achieving sustainable development goals, and national forest programmes should be linked to national and sectoral development plans in a comprehensive manner at all levels.

Some approaches for improving the transfer of environmentally sound technologies for sustainable forest management are provided for the consideration of the ad hoc expert group on subjects, such as improved information management systems, identification and adaptation of appropriate technologies, research and development, capacity-building and financial incentives.

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# I. Introduction

1. The United Nations Forum on Forests, at its third session, agreed on the establishment of an ad hoc expert group on finance and transfer of environmentally sound technologies, and to the convening of a meeting of the ad hoc expert group in Geneva from 15 to 19 December 2003.[1] The Forum agreed that the tasks of the ad hoc expert group regarding the transfer of environmentally sound technologies would be as follows:

(a) Review and assess existing initiatives on the transfer of environmentally sound technologies and knowledge diffusion for the promotion of sustainable forest management among countries and sectors and stakeholders, including through North-South, North-North and South-South cooperation and programmes of members of the Collaborative Partnership on Forests. This should include an analysis of incentives that promote and obstacles that inhibit the transfer of forest-related environmentally sound technologies between and/or within countries, in particular to developing countries and countries with economies in transition, in both the private and public sectors;

(b) Recommend approaches to improve the transfer of forest-related environmentally sound technologies. The recommendation may include the role of various policy instruments, such as concessional and preferential terms, public private partnerships and research cooperation, as well as capacity-building in the use and application of current and emerging environmentally sound technologies, including remote sensing.

2. The objective of the present note by the secretariat is to provide some background information to assist the ad hoc expert group in carrying out the tasks described above. Special attention is given to defining the scope of environmentally sound technologies for sustainable forest management. Information is provided on existing initiatives for the transfer of technologies for sustainable forest management, barriers to the transfer of environmentally sound technologies, as well as approaches for improving the transfer of environmentally sound technologies for sustainable forest management.

3. The Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) addressed different aspects of the transfer of environmentally sound technologies for sustainable forest management in detail and produced a comprehensive global policy agenda in the form of the IPF/IFF proposals for action.

4. A recent country-led initiative in support of the United Nations Forum on Forests, hosted by the Government of Nicaragua in Managua from 3 to 5 March 2003, produced a document entitled "Transfer of environmentally sound technologies for the sustainable management of mangrove forests". It focused on mangrove forests including constraints and conditions affecting technology transfer that are also applicable to other types of forests.

## II. Intergovernmental Panel on Forests/Intergovernmental Forum on Forests proposals for action on the transfer of environmentally sound technologies

5. Of the 270 IPF/IFF proposals for action, 38 deal with environmentally sound technologies for sustainable forest management, with all but five addressing the issue of the transfer of environmentally sound technologies.[2] These have been grouped into 10 clusters and are listed in the table below.

Table
**Intergovernmental Panel on Forests/Intergovernmental Forum on Forests proposals for action related to the transfer of environmentally sound technologies**

| *Thematic area* | *IPF[a]* | *IFF[a]* |
|---|---|---|
| 1. Finance | 71 (b)<br>77 (a) and 77 (c) | 9 (a)<br>56 (a), 56 (c), 56 (d), 56 (e), and 56 (g)<br>87<br>129 (e) |
| 2. National policies for the development and use of environmentally sound technologies | 77 (b) and 77 (d) | 56 (b) |
| 3. Private sector involvement | 69 (a) | |
| 4. Information on environmentally sound technologies | 77 (g)<br>78 (a), 78 (b) and 78 (c)<br>94 (a) (iii) | 56 (o) |
| 5. Development and application of new technologies: lesser used species, by-products and efficient wood energy | 132 (c) | 56 (l)<br>122 (c) |
| 6. Capacity-building in general | 17 (g)<br>77 (e) and 77 (f) | 56 (f) |
| 7. Capacity-building for women | | 56 (m) and 56 (n) |
| 8. Traditional forest-related knowledge | 40 (j), 40 (m) and 40 (r) | 56 (j) |

| *Thematic area* | *IPF*[a] | *IFF*[b] |
|---|---|---|
| 9. Rehabilitation and restoration of degraded lands | | 56 (h) |
| 10. Rehabilitation and conservation strategies for countries with low forest cover | 46 (g)<br>58 (c) | 56 (i) |

[a] Report of the fourth session of the Intergovernmental Panel on Forests (E/CN.17/1997/12).
[b] Report of the Intergovernmental Forum on Forests on its fourth session (E/CN.17/2000/14).

6. Information on progress in the implementation of 6 of the 38 proposals for action on the transfer of environmentally sound technologies can be found in the reports of the Secretary-General to the United Nations Forum on Forests at its second and third sessions, held in New York, from 4 to 15 March 2002 and at Geneva, from 26 May to 6 June 2003, respectively. For the fourth session of the Forum, the reports of the Secretary-General should provide information on progress in the implementation of 12 other proposals for action on the transfer of environmentally sound technologies. A pending issue is the reporting on progress in the implementation of the majority of proposals for action related to such technologies during the regular sessions of the Forum up to 2005. This could be particularly pertinent for the proposals for action under the heading of the transfer of environmentally sound technologies contained in paragraph 77 of the final report of IPF (E/CN.17/1997/12) and paragraph 56 of the final report of IFF (E/CN.17/2000/14).

7. The report on rehabilitation and restoration of degraded lands and the promotion of natural and planted forests (E/CN.18/2002/3) stresses that Governments from developing countries and countries with economies in transition have requested international agencies to assist them in introducing environmentally sound technologies to rehabilitate and restore degraded lands and to promote planted forests, specifically identifying the following as the areas where assistance was most needed: (a) information technology and networks; (b) assessment technologies; (c) research priorities; and (d) modern technology for primary and secondary wood processing for wood products and efficient woodfuel burning equipment. For the area of assessment technologies, the report noted that technical support was coming from a variety of sources, although the capacity of the recipient countries remained weak, due to lack of resources.

8. The report of the Secretary-General on combating deforestation and forest degradation (E/CN.18/2002/6) describes the ways in which some countries have applied specific technologies to combat deforestation, including (a) increased application of remote-sensing and geographic information system technologies; (b) the development of information systems for forest assessment, including the provision of an early warning service for specific threats, such as fire; (c) the development of wood recovery and recycling technologies; and (d) the development of improved harvesting and other silvicultural operations, such as reduced-impact logging methods. The report concluded that a number of countries report the development of forest resource information systems, which will give stakeholders

access to a network of information and tools for sustainable forest management. However, there is clearly an ongoing need to make the benefits of such technology available to a wider range of users and to continue the process of transferring technology from developed to developing countries. There is also a need for increased exchange of experience and technologies among developing countries and for greater use of indigenous technologies and traditional forest-related knowledge, where appropriate (para. 30).

9. The report of the Secretary-General on progress in the implementation of rehabilitation and conservation strategies for countries with low forest cover (E/CN.18/2002/7) recognizes the contributions of the Tehran Process secretariat in enhancing information exchange on environmentally sound technologies among low forest cover countries. It also notes that some countries reported progress in (a) increased application of remote-sensing and geographical information system technologies and (b) development of information systems for forest assessment, including early warning service for forest fires. It concluded that many low forest cover countries have not been able to implement such technologies because of lack of technical capacity and financial resources (para. 29).

10. The report of the Secretary-General on forest conservation and protection of unique types of forests and fragile ecosystems (E/CN.18/2002/9) notes that a number of countries have developed resources information systems, utilizing technologies, such as remote-sensing, geographic information systems and information technologies for monitoring and assessment. As in the report on combating deforestation and forest degradation, it concludes that the benefits of such technology need to be made available to a wider range of users and to continue the process of technology transfer from developed to developing countries.

11. According to the report of the Secretary-General on economic aspects of forests (E/CN.18/2003/7), technology issues are defined not just as engineering approaches but more broadly, as reflected in the IPF/IFF proposals for action (para. 56). It lists the following technology needs identified in national reports to the Forum: forest valuation methodologies, approaches to capture rent, payment mechanisms for environmental services, database systems and silvicultural and forest management techniques. The report underlines the contributions of countries, development agencies and research institutions, particularly in the Consultative Group on International Agricultural Research, in developing knowledge and technology for sustainable forest management and sharing them with needy countries. It concludes that, while many of the multilateral development banks and bilateral donors are promoting technology transfer through their individual projects, much more can be done. In particular development banks and bilateral agencies can help by encouraging the development of appropriate knowledge and technology suitably adapted to the special circumstances of developing countries, facilitating transfer of technology from one developing country to another, and encouraging Governments to enact appropriate regulations that would encourage the adoption of the available environmentally sound technologies in the future (para. 56).

12. The report of the Secretary-General on maintaining forest cover to meet present and future needs (E/CN.18/2003/8) emphasizes that the major need for transfer of environmentally sound technologies in this area involves data collection and information dissemination. Accurate and reliable data are fundamental to the development of long-term national forest strategies. Geographic information

systems and satellite remote sensing to supplement field forest inventories are increasingly being used for data collection. Development and sharing of methodologies for data collection on forest resources that have not traditionally been monitored, including non-wood forest products and trees outside forests, are needed. Forest information management systems constitute another area where transfer of technology is helpful. Internet technology is increasingly important for the dissemination of information electronically. In this area, transfer of technology is more constrained by financial considerations than by technological barriers (para. 48).

13. The resolutions emanating from the discussion of these six documents at the second and third sessions of the United Nations Forum on Forests draw some conclusions on transfer of environmentally sound technologies. In resolution 2/2 on the implementation of the IPF/IFF proposals for action and the plan of action of the United Nations Forum on Forests for all four elements of the plan of action considered at the second session, the Forum urged countries to strengthen international cooperation on finance, trade, transfer of environmentally sound technology and capacity-building. In resolution 3/1 on economic aspects of forests, adopted at the third session, the Forum highlighted that immediate action at all levels to facilitate the provision of financial resources, transfer and development of environmentally sound technologies and capacity-building was required to help to achieve sustainable forest management, especially in developing countries and countries with economies in transition. In operative paragraph 12 of the resolution, the Forum encouraged countries and the international community, recognizing the importance of promoting the needs of small and medium-sized forest industries and their access to affordable and environmentally sound technologies, to support specific initiatives in this field, particularly in developing countries as well as in countries with economies in transition. In resolutions 3/2, on forest health and productivity, and 3/3 on maintaining forest cover to meet present and future needs in their respective operative paragraphs, as well as in resolution 2/2, the Forum called for countries to strengthen international cooperation in the transfer of environmentally sound technology.

14. For the purposes of the work of this ad hoc expert group on transfer of environmentally sound technologies, the reports of the Secretary-General reveal the following important common themes:

(a) Countries in their national reports identified their greatest need for technologies in the following areas:

(i) Development of information management systems for sustainable forest management;

(ii) Utilization of modern monitoring and assessment technologies, including remote sensing and geographic information systems and tools for early warning for specific threats, such as fire;

(iii) Improved harvesting and silvicultural practices;

(iv) More efficient wood processing and utilization technologies;

(b) While, in many cases, it was felt that transfer of environmentally sound technologies for sustainable forest management had been inadequate, it was also felt that progress had been achieved in some countries in (i) the development of

information management systems for promoting sustainable forest management; and (ii) the application of more modern monitoring and assessment technologies;

(c) Many multilateral development banks, bilateral donors and international organizations are actively promoting technology transfer through individual projects, but much more needs to be done.

## III. Linking the transfer of environmentally sound technologies to the development agenda

15. The relevant section on forests of the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg Plan of Implementation) reaffirms support to the United Nations Forum on Forests, with the assistance of the Collaborative Partnership on Forests, as key intergovernmental mechanisms to facilitate and coordinate sustainable forest management at the national, regional and global levels. The Johannesburg Plan of Implementation calls for immediate action at the national and international levels to promote and facilitate the means to achieve sustainable timber harvesting and to facilitate the provision of financial resources and the transfer and development of environmentally sound technologies, and thereby address unsustainable timber-harvesting practices.[3] It further calls for the creation and strengthening of partnerships and international cooperation to facilitate the provision of increased financial resources and the transfer of environmentally sound technologies at all levels to implement sustainable forest management. To this end, the World Summit recognized the importance of accelerating the implementation of the IPF/IFF proposals for action by countries and by the members of the Collaborative Partnership on Forests.

16. The issue of technology transfer needs to be viewed within the broader framework of the role of sustainable forest management in contributing to the global development agenda, particularly on issues such as poverty eradication, improved food security, access to safe drinking water, affordable energy, changing unsustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development. The Plan reaffirms the importance of transfer of environmentally sound technologies as a means of implementation for the achievement of the internationally agreed development goals, including those contained in the United Nations Millennium Declaration, Agenda 21 and the work programme of the Doha Ministerial Conference. To this end, the finance and transfer of environmentally sound technologies for sustainable forest management are essential for achieving sustainable development.

17. This also means that the principle of sustainable forest management would be considered an essential element in achieving sustainable development goals, and national forest programmes should be linked to national and sectoral development plans in a comprehensive manner at all levels.

## IV. Scoping environmentally sound technologies and knowledge for the sustainable management of forests

18. The terms of reference adopted by the United Nations Forum on Forests at its third session for the ad hoc expert group indicate that the issue encompasses a wide

range of subjects, including knowledge diffusion for the promotion of sustainable forest management and policy instruments for improving the transfer of environmentally sound technologies. The scope, therefore, as indicated in box 1 below, goes beyond technologies, such as hardware for the harvesting, transportation and processing of lumber. This was also clearly articulated in the report of the Secretary-General on economic aspects of forests to the Forum at its third session, in which a broad definition going beyond engineering approaches was used and which included, among others, economic instruments for sustainable forest management.

19. Technology is defined as the application of scientific and technical knowledge for practical uses in industry. According to chapter 34 of Agenda 21, environmentally sound technologies are not just individual technologies, but total systems which include know-how, procedures, goods and services and equipment, as well as organizational and managerial procedures. This implies that when discussing transfer of technologies, the human resource development and local capacity-building aspects of technology choices, including gender-relevant aspects, should be addressed. Environmentally sound technologies should be compatible with nationally determined socio-economic, cultural and environmental priorities.[4]

**Box 1**
**A non-exclusive list of areas where specific technologies are needed to improve the forest practices on the ground**

1. Forests resource assessment and science
   - (a) Scientific knowledge
   - (b) Remote sensing
   - (c) Geographical information systems and mapping
   - (d) Monitoring and surveys
   - (e) Forest resource assessment and inventories
   - (f) Valuation
   - (g) Modelling
2. Forest management
   - (a) Forest management systems
   - (b) Silvicultural practices
   - (c) Low-impact forest harvesting methods
   - (d) Rehabilitation and forest restoration
   - (e) Indigenous technologies
   - (f) Protected areas management
   - (g) Information management systems
3. Wood processing and use
   - (a) Saw mill technologies
   - (b) Construction
   - (c) Pulp and paper manufacturing
   - (d) Fuelwood technologies
   - (e) Recycling
4. Non-wood forest products processing and use
   - (a) Non-timber forest products
   - (b) Biotechnology

(c) Forest hydrology
(d) Carbon sequestration

5. Economic instruments for sustainable forest management
(a) Financing sustainable forest management
(b) Foreign direct investments
(c) Payment methods for environmental services

6. Marketing and trade
(a) Certification
(b) Ecolabelling
(c) Market information systems

20. Likewise, the Intergovernmental Panel on Climate Change, in its report entitled "Methodological and technological issues in technology transfer", utilizes a broad definition for technologies in the forest sector. These technologies can include genetically superior planting material, improved silvicultural practices, sustainable harvest and management practices, protected area management systems, substituting fossil fuels with bioenergy, incorporating indigenous knowledge in forest management, efficient processing and use of forest products and monitoring of area and vegetation status of forests. These technologies can meet several objectives, including conserving biodiversity and watersheds, enhancing sustainable forest product flows, increasing the efficiency of use of forest products and maximizing the resilience of forest ecosystems to climate change, in addition to enhancing sinks.[5]

21. The information on environmentally sound technologies and knowledge for sustainable forest management is very extensive. Moreover, changes in environmental conditions from one forest ecosystem to another, or in socio-economic conditions from one country to another, often require further adjustments and adaptations in the use of technologies. The challenge facing developing countries is not merely one of negotiating new opportunities for the transfer of environmentally sound technologies, but of also having sufficient understanding of the range of technologies and knowledge that are most suitable for their national conditions and circumstances.

# V. Pathways for technology transfer

22. Experience in technology transfer in the forest sector is limited when compared to the agricultural and energy sectors. The pathways are complex and tend to be country specific. A number of institutions are involved in the transfer of environmentally sound technologies, generally under the guidance of Governments: multilateral agencies, bilateral aid agencies, international research institutions, national and international non-governmental organizations, forest departments, timber companies, commercial houses, universities and national research institutions.

## A. Government-initiated pathways

23. In developing countries in general, forest research and development of technology is carried out primarily through public universities and research centres

with Government support. These institutions are also the most active in technology transfer directed at forest owners and farmers. However, they are inadequately funded for carrying out these tasks, with few developing countries having adequate capacity in forest science. Industry and indigenous communities are also important players for in-country technology transfer. Government-initiated transfer of technology is often supported and facilitated by international organizations involved in technology development, information dissemination and capacity-building.

## B. Private sector-driven pathways

24. A major portion of research and development and technology transfer is driven by the private sector in developed countries. Technologies and machinery for harvesting, processing and recycling, as well as forest certification methodologies originate principally in industrialized countries. These technologies are generally transferred from private sector entities in developed countries to the private sector in developing countries. More information needs to be collected on knowledge sharing and the potential role of the private sector in technology transfer.

## C. Community-driven pathways

25. Part of technology transfer within developing countries is driven by local communities and non-governmental organizations, in particular, forest conservation practices and systems for harvesting of non-timber and other subsistence products, through training and capacity-building. In some developing countries, communities have organized nation-wide organizations of social forestry enterprises that provide villages with management and technical training and financial resources.

## D. The multilateral pathway

26. Multilateralism provides an emerging pathway for the development of mechanisms for technology transfer. They include the application of multi-purpose forest management systems, the development of sustainable harvesting codes, the adoption of reduced-impact logging programmes, as well as certification schemes and export controls for forest products. A major initiative developed along this pathway is the International Tropical Timber Organization year 2000 objective, in which producer countries that are members committed themselves to obtaining all their internationally traded tropical timber from sustainable managed forests by the end of the twentieth century. Since 1995, a number of similar initiatives at the regional level promoting sustainable forest management have been launched, including the Helsinki Process for boreal, temperate and Mediterranean forests; the Montréal Process for temperate and boreal forests outside Europe; the Tarapoto Proposal for the forests of the Amazon; the United Nations Environment Programme/Food and Agriculture Organization of the United Nations (FAO) Dry-Zone Africa initiative, and the FAO/Central American Commission on Environment and Development (Comisión Centroamericana de Ambiente y Desarrollo) initiative on criteria and indicators for sustainable forest management in Central America.

27. The framework of the United Nations Framework Convention on Climate Change includes joint implementation of activities and emissions trading. Through

the Kyoto Protocol to the Convention, the clean development mechanism has emerged, and will influence forest sector technology transfer and finance. Article 12 of the Protocol defines the clean development mechanism, under which projects that will lead to certified reduction of the emission of carbon dioxide can be implemented.

28. The Intergovernmental Panel on Climate Change special report on land use, land-use change and forestry examines activities and projects to mitigate and adapt to climate change, including the transfer and adoption of technology.[6] These technologies could fall under the following general classes: carbon conservation measures; carbon sequestration; substitution of fossil fuels; and non-sustainable extracted timber. Specific categories of technologies could include (a) silvicultural practices for improved yields; (b) improved genetic stocks; (c) practices for sustainable forest management and protected area management; (d) monitoring and verification of carbon flows in forest projects; (e) use and management of secondary forests; and (g) traditional forest management practices.

29. The Expanded Programme of Work on Forest Biological Diversity draws attention to the need for new and additional financial resources, with technology transfer and capacity-building, for the effective implementation of the expanded programme of work by developing countries. Relevant areas highlighted include improved knowledge of the impact of invasive species, increased understanding of the impact of pollution, development of fire-risk assessment and early warning systems, restoration of forest biological diversity, forest management practices for the conservation of endemic and threatened species, sustainable use of timber and non-timber forest products, development of low-impact harvesting practices for timber and non-timber forest products, the use of traditional forest-related knowledge, development of integrated information systems, improved assessment of the status and trends of forest biological diversity and research on the role of forest biological diversity and ecosystem functioning, among others.

# VI. Existing initiatives on transfer of environmentally sound technologies and knowledge diffusion for the sustainable management of forests

## A. International organizations

30. A wide range of initiatives on the transfer of environmentally sound technologies and knowledge for sustainable forest management is being implemented throughout the world, mostly through projects at the national level. Members of the Collaborative Partnership on Forests, such as the World Bank, FAO, the International Tropical Timber Organization, the Centre for International Forestry Research, the International Center for Research in Agroforestry and International Union of Forest Research Organizations have a number of initiatives in this area. Some are described below.

31. The mission of the Consultative Group on International Agricultural Research is to achieve food security and reduce poverty in developing countries through scientific research and related activities in the field of agriculture, forestry, fisheries, policy and environment. To this end, it receives funding, technical support and strategic direction from 22 industrialized countries, 24 developing countries, 4 private foundations and 12 regional and international organizations. Within this

system, the Centre for International Forestry Research focuses on the management of natural ecosystems as well as plantations. The International Center for Research in Agroforestry concentrates on the role of agroforestry, specifically the adoption of multipurpose trees in sustainable farming systems and the International Plant Genetic Resources Institute focuses on the conservation and utilization of genetic resources of forest tree species. It is estimated that the overall work of the Consultative Group on International Agriculture Research has resulted in the development of more environmentally friendly technologies that have saved millions of hectares of land from cultivation worldwide, thus contributing to the management and conservation of natural resources, including forests and the biodiversity they contain.[7]

32. FAO has been at the forefront in promoting the transfer of environmentally sound technologies and knowledge for sustainable forest management in developing countries. At the core of its work is the provision of direct technical support to countries to help conserve and sustainably manage forests, maintain their health and harvest them wisely. Six critical areas are being addressed in promoting sustainable forest harvesting: harvest planning; forest roads; felling; extraction; long-distance transport; and post-harvest assessment. The FAO Model Code of Forest Harvesting Practice, developed in 1996, promotes harvesting practices for improving standards of utilization, reducing negative environmental impacts, ensuring the sustainability of forests and improving the economic and social contributions of forestry to sustainable development.

33. The International Tropical Timber Organization is also playing an increasingly important role in promoting the transfer of environmentally sound technologies for sustainable forest management in developing countries in the tropics. Projects are the primary means of assisting member countries. Ongoing projects are divided into three categories: economic information and market intelligence, reforestation and forest management and forest industry. Projects in the last two categories contribute directly to the transfer of environmentally sound technologies and knowledge, with a strong emphasis on more efficient processing of tropical timber from sustainable sources.[8]

34. The Global Environment Facility, as the financial mechanism of the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, has provided support for protected areas and mainstreaming biodiversity in forest management systems and landscapes through its forest ecosystem operational programme. These projects focus on promoting sustainable livelihoods by integrating best practices in the conservation and sustainable use of forest resources. Strong emphasis is also placed on the sustainable use of non-timber forest products.

35. Regional development banks, such as the Asian Development Bank and the Inter-American Development Bank are also promoting a number of initiatives on forests, many of which support the transfer of environmentally sound technologies and knowledge. The Asian Development Bank's Forest Policy has as its goal the improvement of sustainable forest management for poverty reduction and environmental protection. One of its strategies is to enhance the use of "technology blending", which is the blending of modern and indigenous technologies for improving forest condition and productivity.[9]

## B. North-South initiatives

36. The majority of North-South initiatives on the transfer of environmentally sound technologies are bilateral. It would be useful to have a database of these projects for future reference. For the purposes of the present paper, a few examples of North-South initiatives are provided.

37. The European Union, through its Forestry Strategy, provides support for international and pan-European cooperation to protect forests at the European level and globally, in particular to avoid forest destruction in other parts of the world which could have long-term implications for the sustainability of forests and the environment of the world.[10] Priority areas for assistance include capacity-building, research for sustainable forest management and forest ecosystem conservation. This assistance is being provided at the national, regional and international levels and takes into account support for developing countries to fulfil commitments arising from relevant international environmental agreements.

38. In response to the United Nations Framework Convention on Climate Change and its Kyoto Protocol, a number of developing countries and countries with economies in transition have or are developing national climate change action plans that integrate forestry-sector mitigation and adaptation options. These countries include Bulgaria, China, Hungary, Mexico, Nigeria, the Russian Federation, Ukraine and Venezuela.[11]

## C. North-North initiatives

39. The Ministerial Conference on the Protection of Forests in Europe is perhaps the best example of North-North cooperation in technology transfer. Established in 1990, the Conference is committed to technical and scientific cooperation, as well as to common measures, for the protection and sustainable use of forests in Europe. The Second Ministerial Conference, held in Helsinki in 1993, resulted in resolutions on sustainable forest management (H1) and biological diversity on forests (H2), including a common definition of sustainable forest management. The Helsinki Conference, through resolution H3, agreed on increasing cooperation with countries with economies in transition, concluding that such cooperation may take the form of transfer of knowledge, and of bilateral and multilateral projects, and should focus on technical, scientific, institutional and legal matters.

40. Forest-related technology transfer through climate change mitigation projects among annex 1 countries of the United Nations Framework Convention on Climate Change (developed countries and countries with economies in transition) is largely driven by the private sector.

## D. South-South initiatives

41. A comprehensive analysis of South-South cooperation in the transfer of environmentally sound technologies and knowledge needs to be undertaken, with a view to understanding lessons learned, including identifying effective programmatic approaches for the transfer of environmentally sound technologies for sustainable forest management, analysing the effectiveness of information exchange among countries, evaluating the impact of the transfer of environmentally sound

technologies and knowledge in achieving national objectives and goals and assessing the suitability of regional cooperative frameworks for technology transfer, among others.

42. Regional cooperation frameworks have been used for promoting transfer of environmentally sound technologies for sustainable forest management among developing countries, such as the Southern African Development Community. The Association of South-East Asian Nations, through its meetings of the Ministers responsible for the environment, has promoted the transfer of firefighting and fire-prevention techniques and measures. The Agricultural Research and Higher Education Centre (Centro Agronómico Tropical de Investigación y Enseñanza), which is supported by the Ministers of Agriculture of Central America, the Dominican Republic and Venezuela, as well as donor countries, has been active in research and development of environmentally sound technologies for sustainable forest management and in their transference and adaptation to member States through their national forest departments. In March 2003, the member States of the Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Environment of the North-east Pacific adopted a regional strategy for the sustainable management of mangrove forests from Colombia to Mexico with a strong component for the transfer of environmentally sound technologies.[12]

43. The country-led initiative in Managua on mangroves (2003) underscored that there are a number of initiatives that have been promoted by international organizations in developing countries on the transfer of environmentally sound technologies for mangroves. It also revealed that there is a need to link these initiatives more closely through exchanges of experiences, technical information, results and lessons learned. While most projects are being carried out at the national level, few projects are being implemented through regional cooperation mechanisms that could underpin the sharing of experiences and exchange of information on transfer of environmentally sound technologies for mangroves among developing countries.

## VII. Obstacles and constraints to transfer of environmentally sound technologies

44. There are a number of barriers that constrain the successful transfer of environmentally sound technologies and knowledge for the sustainable management of forests. These are listed in box 2. The constraints set out in box 2 can basically be divided into six groups: institutional constraints and policies at the national level; human resources; access to information on environmentally sound technologies and knowledge for sustainable forest management; support for forest research and development of environmentally sound technologies for sustainable forest management; outreach programmes for involving the private sector and local communities; and financial resources for the effective transfer of environmentally sound technologies. Further analytical efforts are needed to categorize the obstacles and challenges facing the transfer of environmentally sound technologies.

45. The barriers, which generally apply to the broader context of forests, are addressed in the report of the Intergovernmental Panel on Climate Change, entitled "Methodological and technological issues in technology transfer, as follows: (a) limited financial resources; (b) inadequate information on the costs and potential

benefits; (c) absence of policies and institutions to process, evaluate and clear mitigation projects; (d) uncertainty regarding quantity of carbon abated and its permanence; (e) a longer period to realize carbon benefits (e.g. hardwood timber plantations); (f) low economic returns for some technologies; and (g) absence of consideration of the economic value of environmental benefits. In addition, the forestry sector faces land-use regulation and other macroeconomic policies that usually favour conversion to other land uses such as agriculture and cattle ranching. Insecure land-tenure regimes and tenure rights and subsidies favouring agriculture or livestock are among the most important barriers for ensuring sustainable management of forests, as well as sustainability of C (carbon) abatement.[13]

46. A more systematic assessment of the needs for technology transfer of developing countries is required to overcome these obstacles. Consideration should be given to the preparation of a comprehensive assessment of progress in the implementation of all the proposals for action set out in the table in paragraph 5 above, based on country reports.

**Box 2**
**Constraints affecting the transfer of environmentally sound technologies and knowledge**

- Unsuitability of policies and laws at the national level for promoting the transfer of environmentally sound technologies, including inadequate integration of sustainable forest management issues and concerns into national, sectoral, regional and local development plans
- Ineffective management
- Inadequate institutions at the national level
- Lack of coordination among national agencies
- Inadequate human resources
- Inadequate information management systems
- Limited access to information systems at the international level
- Insufficient support for forest research and development of environmentally sound technologies for sustainable forest management in many countries
- Limited participation of the private sector
- Limited participation of local communities
- Land tenure and property rights
- High costs to acquire, use and maintain technologies (e.g., hardware, software)
- Limited financial resources for promoting the transfer of environmentally sound technologies, including capacity-building for the development of know-how
- Regulations favouring short-term profits in the forest sector over long-term sustainability
- Higher opportunity costs, particularly in agriculture, for alternative land uses

## VIII. Conditions favouring transfer of environmentally sound technologies

47. Most of the conditions favouring the transfer of environmentally sound technologies for sustainable forest management are basically the opposite of the constraints listed above: adequate institutions and policies at the national level; adequate human resources; easy access to information on environmentally sound technologies and knowledge for sustainable forest management; strong support for forest research and development of environmentally sound technologies for sustainable forest management; effective outreach programmes for involving the private sector and local communities; and adequate financial resources for the effective transfer of environmentally sound technologies.

48. The number and degree of obstacles for technology transfer vary according to the level of development of the recipient country. The more developed a country, the greater the chance of successfully transferring environmentally sound technologies and knowledge, which means that greater assistance is needed for less developed countries.

49. Transfer of environmentally sound technologies for sustainable forest management could be carried out more effectively in those countries where national forest programmes have been linked to and the goals of the principle of sustainable forest management integrated into national development plans and, consequently, into national sectoral development plans, as well as regional and local development plans.

50. Technologies are more likely to be transferred successfully if they are cost-effective in comparison to existing technologies. An analysis of suitability and adaptation of environmentally sound technologies for each country, particularly equipment and machinery, needs to take into account their cost-effectiveness.

51. Financial incentives can be effective measures for promoting the transfer of environmentally sound technologies. These include, among others, financial incentives, such as tax breaks for companies importing timber from sustainably managed forests, financial incentives for adopting sustainable forest management practices (e.g., reduced impact logging), tax rebates and financial incentives for companies promoting the recycling of wood and financial incentives for companies importing equipment and products that contribute to sustainable forest management.

52. Where they exist, regional cooperation frameworks, such as the United Nations economic and social commissions, the FAO regional commissions, the Association of South-East Asian Nations, the Southern African Development Community, the Agricultural Research and Higher Education Centre, the Central American Commission on Environment and Development, the Mediterranean Commission for Sustainable Development and the Ministerial Conference on the Protection of Forests in Europe could serve as regional mechanisms for facilitating the transfer of environmentally sound technologies for sustainable forest management among member States.

## IX. Approaches for improving the transfer of environmentally sound technologies for the sustainable management of forests

53. Following are some approaches for improving the transfer of environmentally sound technologies for sustainable forest management that the ad hoc expert group may wish to consider in support of the United Nations Forum on Forests:

(a) Provision of assistance to countries in the development of national policies, programmes, regulations, instruments, mechanisms and institutions for the sustainable management of forests;

(b) Adoption of the principle of sustainable forest management when linking the national forest programmes to national development plans and integrating national programmes for human resource development to national forest programmes;

(c) Incorporation of financing, technology transfer and capacity-building for sustainable forest management into national sectoral development plans and regional and local development plans;

(d) Development of an integrated information management system, such as a clearing house mechanism, for disseminating information on environmentally sound technologies and knowledge for sustainable forest management;

(e) Strengthening institutional capacities within countries for monitoring and assessing forest resources, including non-timber resources, and assisting countries in identifying the most appropriate technologies to that end;

(f) Strengthening of institutional capacities within countries (universities and research institutions, forest departments and industry) for research and development of environmentally sound technologies and knowledge for sustainable forest management and for transferring these to local producers and communities;

(g) Increased funding for transfer of environmentally sound technologies in multilateral and bilateral agencies, as well as international organizations and development of financial mechanisms for supporting transfer of environmentally sound technologies;

(h) Development of a methodology for analysing the cost implications of replacing unsustainable technologies with environmentally sound technologies for sustainable forest management;

(i) Development of regulations at the national level for promoting sustainable forest management in areas such as deforestation, logging practices, efficient wood processing, recycling of forest products and certification, among others;

(j) Creation of an enabling environment for the transfer of proprietary technologies and technologies in the public domain;

(k) Development of national policies on land and product tenures with a view to promoting participation of local communities;

(l) Utilization of financial incentives as a measure for promoting the transfer of environmentally sound technologies, such as financial incentives for companies importing sustainable timber, financial incentives for adopting sustainable forest management practices (e.g., reduced impact logging), tax rebates and financial incentives for companies promoting the recycling of wood, and financial incentives for companies importing equipment and products that contribute to sustainable forest management, among others;

(m) Promotion of public awareness among decision makers, local authorities, local communities, civil society and the public in general about the importance of utilizing environmentally sound technologies for sustainable forest management and the socio-economic and environmental benefits that they can generate.

# X. Conclusions

**54. Lack of funding and limited technical capabilities in developing countries impact negatively on the effective transfer of environmentally sound technologies for sustainable forest management.**

**55. The level of financial support provided from multilateral and bilateral sources for the transfer of environmentally sound technologies is relatively low and inadequate.**

**56. With few exceptions, developing countries lack the capacity to advance research and development of environmentally sound technologies and to transfer and adapt these technologies to local conditions.**

**57. For developing countries, access to information on environmentally sound technologies and knowledge for sustainable forest management needs to be improved through strengthened integrated information management systems, including the development of a clearing-house mechanism on environmentally sound technologies for sustainable forest management.**

**58. National forest programmes need to give priority attention to the transfer and adaptation of environmentally sound technologies for sustainable forest management, including the elimination of barriers to technology transfer. A large part of technology transfer is driven by the private sector, which needs to be more closely involved in the formulation and implementation of transfer of environmentally sound technologies strategies under national forest programmes.**

**59. Governments can play a larger role in promoting the transfer of environmentally sound technologies through the development of regulatory measures and financial incentives for sustainable forest management. Greater participation by civil society, local authorities and the private sector in forest initiatives and enforcement of regulations should be promoted.**

**60. The principle of sustainable forest management should be considered and adopted as an essential operational element in achieving sustainable development goals, and national forest programmes should be linked to and their goals integrated into national development plans and into national sectoral development plans in a comprehensive manner at all levels.**

**61. Multilateral agreements provide a pathway for promoting technology transfer for sustainable forest management, such as the clean development mechanism of the Kyoto Protocol to the United Nations Framework Convention on Climate Change. Consideration should be given to the role that the Global Environment Facility can play as a possible financial mechanism for sustainable forest management.**

*Notes*

[1] The ad hoc expert group was subsequently established formally by a decision of the Economic and Social Council.

[2] Intergovernmental Panel on Forests: 40 (j), 40 (m), 40 (r), and 46 (g): IFF: 122 (c).

[3] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[4] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (United Nations publication, Sales No. E.93.I.8 and corrigenda), vol. I: *Resolutions adopted by the Conference*, resolution 1, annex II.

[5] Intergovernmental Panel on Climate Change, "Methodological and technological issues in technology transfer (2000)", chap. 12.2.

[6] Intergovernmental Panel on Climate Change, "IPCC special report: land use, land-use change and forestry: Summary for policymakers (2000)".

[7] Consultative Group on International Agricultural Research online, Areas of research: forestry and agroforestry (www.cgiar.org/research/res_forestry.html).

[8] International Tropical Timber Organization, Summary of projects, pre-projects and activities (2003).

[9] Jyrki Salmi, Markku Simula, and Essa Puustjarvi, "Forest Financing in Latin America: the role of the Inter-American Development Bank", Sustainable Development Department (2002).

[10] European Commission, Communication from the Commission to the Council and the European Parliament on a Forestry Strategy for the European Union (November 1998), p. 6.

[11] Some examples of projects involving partnerships between private sector corporations from the north and Governments in the south are provided in Intergovernmental Panel on Climate Change, Methodological and technological issues in technology transfer, chapter 12.5.4.

[12] United Nations Environment Programme, report of the Second Intergovernmental Meeting of the Action Plan for the Antigua Guatemala Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the North-east Pacific (March 2003), pp. 6-7.

[13] Intergovernmental Panel on Climate Change, "Methodological and technological issues in technology transfer (2000)", chap. 12.3.4.